REMARKS

Claims 5-26 are pending. Claims 5-13 have been amended, claims 1-4 have been cancelled, and new claims 14-26 have been added to recite additional features of Applicant's invention. In addition, a Proposed Amendment to the Drawings has been submitted with this paper to correct a typographical error in Figure 1.

Reconsideration of the application is respectfully requested for the following reasons.

In the Office Action, the Examiner rejected claims 1-3, 5-8, 12, and 13 under 35 USC § 102(b) for being anticipated by the Chua article. While claim 4 was not expressly indicated to be subject to this rejection, the remarks in the Office Action appear to indicate that claim 4 was intended to be included. Notwithstanding this discrepancy, claims 1-4 have been cancelled, thereby making the § 102(b) rejection applicable to claims 5-8, 12, and 13 only. Applicant traverses the rejection of these claims for the following reasons.

Claims 1-4 were replaced with claims 14-26. It is respectfully submitted that these new claims are patentably distinguishable from the Chua article.

Claim 14 recites an image data structure which includes a first grid and a second grid, where the first grid and the second grid express a feature of an image at different resolutions. This structure is illustratively shown in Figure 1, where G_1st (M_1 x N_1 corresponds to the first grid and G_2nd (M_2 x N_2) correspond to the second grid. From this figure, it is clear that the second grid expresses a feature of an image using a higher resolution (e.g., with a larger number of cells) than the first grid.

The Chua article discloses a method for representing the color-spatial information of an image using a grid.

In order to anticipate claim 14, the Chua article must disclose every feature recited in that claim, either explicitly or inherently. *In re Schreiber*, 44 USPQ.2d 1429, 1431 (Fed. Cir. 1997).

Claim 14 is different from the Chua article in a number of ways. For example, claim 14 recites representing an image using two grids and that those grids express a feature of an image at different resolutions. The Chua article does not disclose this feature.

The Chua article discloses a method for representing color-spatial information of an image. This method includes dividing the image into a grid of m x n cells of equal size. Such a grid (eight cells by four cells in size) is shown in Figure 1 on page 364 of the Chua article. Once this grid is formed, a cell-by-cell analysis is performed. This analysis includes determining how many pixels in each cell corresponds to a certain color. If the number of pixels of that color exceeds a threshold value, the cell is deemed to correspond to that color. (Cells of this type are shown as shaded cells in Figure 1). If the number of pixels of the color does not exceed the threshold value, the cell is deemed not to correspond to that color. (Cells of this type are shown as unshaded cells in Figure 1). See paragraph 3.1 on page 363.

Once this analysis is completed, two color histograms H_i and H_c are generated to represent the color compositions of the image. The first histogram, H_i, represents the color composition of the entire image and the second histogram, H_c, represents the color composition of the image just at its center. (See lines 1-19 of the left column of page 364). The

resulting histograms provide a representation of the background color and the object (center) color of the image respectively.

In the Office Action, the Examiner appears to have drawn a correspondence between the grids of the claimed invention and the background and object colors generated by the Chua patent respectively. Applicant respectfully submits that such a correspondence cannot be properly drawn. First, a grid is not a histogram. More specifically, a histogram may be generated from values in a grid, but the histogram itself is not a grid. The claimed invention generates **two grids** for generating a color-spatial representation of an image. While the Chua patent generates two histograms, one for determining background color and the other for determining object (or center) color of an image, both the background and center colors are generated using a single grid, namely the grid shown in Figure 1 on page 364 of the Chua article. The Chua article does not disclose generating two grids for determining a spatial-color representation at any time and thus is different from claim 1.

Second, claim 14 recites that its two grids are of **different resolutions**. The Chua article also does not disclose these features. The first histogram of Chua, H_i, is indicative of a background color and the second histogram, H_c, is indicative of an object (or center) color. Both histograms are generated from a single grid which has a single resolution, i.e., all the cells in the grid of Figure 1 are of the same size and thus express the spatial color of an image using a single resolution. The Chua article does not disclose generating grids of different resolutions for representing a feature of an image and thus does not correspond to the invention as recited in claim 14.

Because the Chua article does not disclose all the features of claim 14, it is respectfully submitted that the Chua article cannot anticipate this claim. It is further submitted that these differences are sufficient to render claim 14 and its dependent claims non-obvious and thus patenable over Chua.

Applicant further notes that the Chua method is similar to the conventional method described in the Background of the Invention section of the specification. The Background section indicates that conventional methods for providing a spatial-color representation of an image use only a single grid. These single-grid methods are often inaccurate and therefore make the systems in which they are incorporated unreliable. By using multiple grids each having a different resolution, the claimed invention overcomes these drawbacks, i.e., by using a plurality of grids at different resolutions the claimed invention advantageously generates a more accurate representation of the spatial color of an image. This improves the reliability of the host system and therefore in at least this respect the claimed invention represents a significant improvement in the art. For all the foregoing reasons, it is respectfully submitted that the claimed invention is patentably distinguishable from Chua.

Claim 15 recites that the first grid includes a first number of cells and the second grid has a second number of cells different from said first number of cells. None of these features are taught or suggested in Chua, i.e., the Chua method only uses one grid to generate the histograms indicating the background and object colors of an image. It is therefore clear that generating two grids having different numbers of cells is not disclosed in this article.

Claim 16 recites that the second number of cells recited in claim 15 is greater than said first number of cells. None of these features are taught or suggested in Chua.

Claim 17 recites that the first grid and the second grid are hierarchically related. This claim therefore defines a structure where, for example, the second grid has a higher resolution than the first grid. None of these features are taught or suggested in Chua.

Claim 18 recites that the second grid includes a plurality of groups of cells, each group representing the feature of said image at different areas within a respective one of the cells in the first grid. This is illustratively shown in Figure 1 of applicants drawings where each cell in the first grid (G_1st) is partitioned into four smaller cells in the second grid (G_2nd). Each of these smaller cells may then be used to represent separate color values for different portions of the cell in the first grid. None of these features are taught or suggested in Chua.

Claim 19 recites that the feature is a spatial color feature. None of claims 14-18 indicate what features is being represented. Claim 19 recites that this feature may be color. As those skilled in the art can appreciate, other features may also be represented by the claimed invention.

Claim 20 recites that each of the cells in the first grid is assigned a first value and a second value for representing the spatial color feature of said image. None of these features are taught or suggested in Chua. Chua uses only one grid to generate a color spatial representation, and each cell of this grid is either assigned a shaded value (indicating that the cell corresponds to a certain color) or a non-shaded value (indicating that the cell does not correspond to the certain color). Thus, while two histograms are generated by Chua, one for the entire image and

one for the center of the image, Chua does not teach or suggest that the **individual cells** of its grid are assigned two values representing spatial color of the image. Rather, the two histograms are generated based on the single value (shaded or non-shaded) assigned to each grid cell.

Claim 21 recites that the first value is a regional representative color and the second value is a **reliability score** indicative of an accuracy of the regional representative color. Clearly, none of these features are taught or suggested in Chua.

Claim 22 recites that each of the cells in the second grid is assigned multiple values for representing the spatial color feature of said image. None of these features are taught or suggested in Chua.

Claim 23 recites that the number of cells in the first grid and the number of cells in the second grid are proportional to a size of the image. None of these features are taught or suggested in Chua.

Claim 25 recites that the image has a non-square shape, and wherein a first side of the image is divided uniformly and a second side of the image is divided based on a dividing unit of the first side, said divisions forming the cells in the first grid. None of these features are taught or suggested in Chua.

Claim 26 wherein each of the cells in the first grid have a first size and each of the cells in the second grid have a second size different from said first size. None of these features are taught or suggested in Chua.

Turning now to the method claims, claim 5 recites an image search method which includes determining color similarity between a reference image and a target image, each of which is represented by hierarchical grid levels, and searching images based on a content-based query by a user. As previously discussed, the Chua article only uses one grid to determine a spatial color representation of an image. Chua does not generate two grid levels, let alone ones which are hierarchical in nature. It is respectfully submitted that these differences are sufficient to patentably distinguish claim 5 and its dependent claims from the Chua article.

Claim 6 recites that said determining step includes matching cells in the grid levels of the reference image with cells in the grid levels of the target image. The Chua article does not generate multiple grid levels for each image. Thus, it is clear that the features of claim 6 are missing from the Chua article.

Claim 7 recites that the determining step includes matching the grid levels of the reference image with respective ones of the grid levels of the target image, and cross-matching grid levels of the reference image with grid levels of the target image. None of these features are taught or suggested in Chua.

Claim 8 recites that the determining step includes matching region representative color values between the grids levels of the reference and target images. None of these features are taught or suggested in Chua.

Claim 9 recites the additional steps of determining a similarity between cells in the grid levels of the reference and target images in accordance with steps that include multiplying color similarity (Color_Sim) corresponding to a similarity of region representative colors between cells

in the grid levels of the reference and target images and a first weight, adding a value obtained by multiplying similarity (I) representing a similarity of a reliability between cells in the grid levels of the reference and target images and a second weight to the color similarity (Color Sim), and normalizing the cell similarity. None of these features are taught or suggested in Chua.

Claim 10 recites determining a similarity between same grid levels in the reference and target images based on a total value summed by shifting in a horizontal and vertical direction based on a shifting amount by a difference of widths and heights between grid levels when two grid levels are compared and the similarity is calculated. None of these features are taught or suggested in Chua.

Claim 11 recites determining a color similarity between the grids of the reference and target images based on a value summed shifting in a horizontal direction and a vertical direction by a difference in width and heights between the grid levels. None of these features are taught or suggested in Chua.

Claim 12 recites that a cell similarity between grid levels of the reference and target images is used for searching a same position and different position between same levels in the case that the search is performed by matching a color region. None of these features are taught or suggested in Chua.

Claim 13 recites that a color region matching operation between the grid levels of the reference and target images is directed to searching at a same position of different levels and at a different position when searching the color similarity between different levels. None of these features are taught or suggested in Chua.

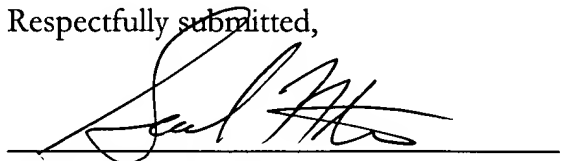
Reconsideration and withdrawal of all the rejections and objections made by the Examiner is hereby respectfully requested.

In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance of the application is respectfully requested.

Should the Examiner believe that further amendments are necessary to place the application in condition for allowance, or if the Examiner believes that a personal interview would be advantageous in order to more expeditiously resolve any remaining issues, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR § 1.136. Please charge any shortage in fees due in connection with this application, including extension of time fees, to Deposit Account No. 16-0607 (Attorney Docket No. P-082) and credit any excess fees to the same Deposit Account.

Respectfully submitted,



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Marked-Up Version of the Amended Claims

5. (Amended) An image search method [using a multilevel image data structure], comprising [the steps of]:

determining color similarity between [matching a spatial color feature of] a reference image and a target image, each of which is [are] represented by [to different] hierarchical grid levels; and

searching images based on a content-based query by a user.

6. (Amended) The method of claim 5, wherein said determining step [color similarity between two images having different hierarchical grid levels is obtained by] includes:

matching [each cell included in] cells in the grid levels of the reference image with cells in the grid levels of the target image [two different image grids and based on a similarity between the representative color values having a spatial color feature].

7. (Amended) The method of claim 5, wherein said determining step [color similarity between two images having different hierarchical grids is obtained by] includes:

matching the grid levels of the reference image with respective ones of the grid levels of the target image, and cross-matching grid levels of the reference image with grid levels of the target image [two image grids, performing a multi-cross in accordance with a spacious color features between the images and comparing a color similarities].

8. (Amended) The method of claim 5, wherein said determining step [a color similarity between two images having different hierarchical grids is obtained by] includes:

matching [each] region representative color values [for thereby searching the similar regions] between the grids levels of the reference and target images.

9. (Amended) The method of claim 5, [wherein] further comprising:

determining a [cell] similarity between cells [included] in the [image] hierarchical grid levels of the reference and target images [having different hierarchical levels is obtained by] in accordance with steps that include:

multiplying [the] color similarity (Color_Sim) corresponding to a similarity of [the] region representative colors between [two] cells in the grid levels of the reference and target images and a [the] first weight,

adding a value obtained by multiplying [the] similarity (I) representing a similarity of a reliability between [two] cells in the grid levels of the reference and target images and a second weight to the color similarity (Color_Sim), and

normalizing the cell similarity.

10. (Amended) The method of claim 5, [wherein] further comprising:

determining a [cell] similarity between [the two] same grid levels [is obtained] in the reference and target images based on a [the] total value summed by shifting in a horizontal and vertical direction based on a [the] shifting amount by a [the] difference of [the] widths and heights between grid levels [grids] when two grid levels [grids] are compared and the similarity is calculated.

11. (Amended) The method of claim 5, [wherein] further comprising:

determining a color similarity between the [two different] grids of the reference and target images [is obtained] based on a value summed shifting in a horizontal direction and a vertical direction by a [the] difference [of the] in width and heights between the [grids] grid levels.

12. (Amended) The method of claim 5, wherein a cell similarity between [image grids] grid levels [having a multilevel] of the reference and target images is used for searching a [the] same position and different position between [the] same levels [between the images] in the case that the search is performed by matching a [the] color region.

13. (Amended) The method of claim 5, wherein a color region matching operation between [two image grids] the grid levels of the reference and target images [having a multilevel] is directed to searching at a [the] same position of different levels and at a different position when searching the color similarity between different levels.

FIG. 1